Cohort Profile

Huisman, Martijn; Oldehinkel, Albertine J.; de Winter, Andrea; Minderaa, Ruud B.; de Bildt, Annelies; Huizink, Anja C.; Verhulst, Frank C.; Ormel, Johan

Published in:
International Journal of Epidemiology

DOI:
10.1093/ije/dym273

Published by Oxford University Press on behalf of the International Epidemiological Association
International Journal of Epidemiology 2008;37:1227–1235
doi:10.1093/ije/dym273

COHORT PROFILE

Cohort Profile: The Dutch 'TRacking Adolescents' Individual Lives' Survey'; TRAILS

Martijn Huisman,[1]* Albertine J Oldehinkel,[1,2] Andrea de Winter,[1] Ruud B Minderaa,[3] Annelies de Bildt,[3] Anja C Huizink,[1,2] Frank C Verhulst[2] and Johan Ormel[1]

Accepted 10 December 2007

How did the study come about?

Mental disorders account for one-fifth of the total burden of disease in the Western world,[1] and, as such, should require due attention from the international epidemiological research community. Good quality research on the aetiology and course of psychopathology in the population is impossible without reliable and valid data from long-term longitudinal cohort studies.

Research on psychopathology in adolescence is important both from a scientific point of view and from the point of view of prevention and public health policy. Adolescence is characterized by major biological, psychological and social challenges and opportunities, where interaction between the individual and environment is intense, and developmental pathways are set in motion or become established.[2–4] Furthermore, adolescent psychopathology can have important consequences for education, relationships and socioeconomic achievement in later life.[5–7] These characteristics of adolescence do not only set high demands for cohort studies aiming to capture the most salient aspects of developmental pathways, they also ensure a great gain in empirical knowledge and an invaluable source of information for public health policy from such studies. In order to fully benefit from this potential, a multidisciplinary approach is essential.

The 'Tracking Adolescents' Individual Lives' Survey' (TRAILS) has taken such an approach. It started in 2001 in order to learn more about the aetiology and course of psychopathology in the Dutch population. Because most forms of adult psychopathology have antecedents and precursors in childhood and adolescence it was decided that a cohort of sufficient size should at least follow respondents from preadolescence up until at least early adulthood. The period from preadolescence into adulthood can furnish major insights into the causes of mental (ill-)health, (mal)adjustment and social development. Within this period there is a substantial rise in psychopathology. In The Netherlands, the 1-year prevalence of psychiatric disorders increases from about 10% at age 10–12 to 25% at age 23–25, of whom nearly half suffer from significant impairments.[8,9]

The TRAILS consortium is broad and multidisciplinary. It includes members of various departments, including (child and adolescent) psychiatry, epidemiology and biostatistics, social sciences, health sciences, movement sciences, pediatrics and respiratory disease across several universities throughout The Netherlands. Principle investigators are Prof. J. Ormel of the Department of Psychiatry of the University Medical Center Groningen, and Prof. F.C. Verhulst of the Department of Child and Adolescent Psychiatry of the Erasmus University Medical Center Rotterdam.

What does the study cover?

The overall objective of the study is to contribute to the understanding of the determinants of adolescents' mental (ill-)health and social development during adolescence and young adulthood, as well as the mechanisms underlying the associations between determinants and these outcomes. A particular aim is to focus on the interplay between individual characteristics and environmental factors. In addition to this major objective, a number of participants investigate the course and determinants of somatic (ill-)health, covering topics such as overweight, lung disease, sports, and physical activity.

[1] Department of Psychiatry, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands.

[2] Department of Child and Adolescent Psychiatry, Erasmus Medical Center, Rotterdam, The Netherlands.

[3] Department of Child and Adolescent Psychiatry, University Medical Center Groningen, The Netherlands.

* Corresponding author. Department of Psychiatry, University Medical Center Groningen, PO Box 30001, 9700 RB, Groningen, The Netherlands.
E-mail: martijn.huisman@med.umcg.nl

Who is in the sample, how long have they been followed and what is attrition like?

The sampling procedure consisted of two stages. First, five municipalities in the North of The Netherlands (including urban and rural areas) were requested to provide information from the community registers (i.e. name, date of birth, gender, address) of all inhabitants that were born between 1 October 1989 and 30 September 1990 (first two municipalities) or between 1 October 1990 and 30 September 1991 (last three municipalities). Subsequently, all primary schools (including schools for special education) received a letter accompanied by detailed information about the goals, design and practical procedures of TRAILS. School participation was a prerequisite for eligible children and their parents to be approached. A total of 135 primary schools were identified, encompassing 3483 eligible children. Of the 135 schools 13 refused to participate, resulting in the exclusion of 338 children. Secondly, parents/guardians were informed through information brochures (one for themselves and one for their children) about the study goals, selection procedure, confidentiality and administered measures of the study. Shortly thereafter an interviewer contacted the parents by telephone to invite the parents and the child to participate. Of the 3145 remaining eligible children 210 were excluded because they were either unable to participate or incapable to participate due to severe mental retardation or due to a serious physical illness or handicap, or if no Dutch-speaking parent or parent surrogate was available (Turkish and Moroccan parents who were unable to speak Dutch were interviewed in their own language). After intensive recruitment efforts (including telephone calls, reminder letters and home visits), a total of 2230 children (76.0%) were included in the study at baseline. Baseline (first wave) measurements took place in March 2001 through July 2002. The response of 76.0% was considered to be adequate given the fact that both child and parent had to agree to participate.

The second wave of the study was conducted from September 2003 to December 2004. Of the 2230 baseline participants, 96.4% ($N = 2149$) participated again during the second wave. At baseline as well as at the second wave, there were no indications of differences in the prevalence of psychopathology between participants and non-participants. However at baseline, boys, children with a lower socioeconomic background and children with relatively poor school performance were somewhat more likely to belong to the non-participants (44.2% of non-responders had a parent with lower secondary education or less versus 32.6% in responders; 28.4% of non-responders were in need of additional help due to learning difficulties vs 21.1% of responders).[10] There were no significant differences in the prevalence rates of psychopathology according to teacher ratings[10] (Table 1).

Table 1 Characteristics of responders versus non-responders of the population and the clinical cohort

Population cohort	**Responder ($N = 2230$)**	**Non-responder ($N = 705$)**
Girls (%)	50.8***	43.1
Low educational level parent[a] (%)	32.6***	44.2
Prevalence of Psychopathology[b]		
Anxious/depressed	19.4	20.0
Withdrawn/depressed	21.6	24.8
Delinquent behaviour	7.1	8.0
Somatic complaints	13.9	14.8
Aggressive behaviour	18.2	19.2
Social problems	16.3	16.4
Thought problems	6.4	6.0
Attention problems	31.6	34.6
Clinical cohort	**Responder ($N = 543$)**	**Non-responder ($N = 526$)**
Girls (%)	34.4	34.1
Low educational level parent[a] (%)	48.3	51.7
Age at referral (%)		
5 years and younger	18.4	20.8
6–9 years	67.1	66.1
10 years and older	14.4	13.1
Mean scores of Psychopathology[c] (SD)		
Anxious/depressed	5.8 (4.7)	5.7 (4.3)
Withdrawn/depressed	3.8 (3.2)	3.6 (3.0)
Delinquent behaviour	2.4 (2.7)	2.5 (2.8)
Somatic complaints	1.3 (1.9)	1.2 (2.0)
Aggressive behaviour	7.9 (8.2)	8.7 (8.1)
Social problems	4.2 (3.7)	4.1 (3.4)
Thought problems	2.1 (2.6)	1.8 (2.5)
Attention problems	16.4 (10.6)	17.1 (10.4)

[a]Low educational level was defined as having 'lower tracks of secondary education' or less education.
[b]Prevalence of psychopathology was measured with teacher ratings on the Teachers Checklist of Psychopathology. Response options range from '0 not applicable' to '4 very clearly or frequently applicable'. For the assessment of psychopathology percentages were calculated covering response option 2 'apply a little or sometimes' to 4.
[c]Mean scores of psychopathology were measured with the Youth Self-Report (YSR). Differences between respondents and non-respondents were tested via *t*-test.
***Statistically significant difference at $P < 0.001$ between responders and non-responders.

The mean age of the baseline sample was 11.09 years (SD = 0.56), and 50.8% of the respondents

were girls. At second wave the mean age of the participants was 13.55 years (SD = 0.54), and girls constituted 51.2% of the sample. Currently data collection for the third wave is being conducted, which will be completed by the end of 2007. Data collection for the fourth wave will commence in September 2008.

The TRAILS Clinical Cohort runs in parallel with the TRAILS general population cohort. The clinical cohort consists of 543 children of initially 10–12 years of age (mean age 10.89 years) who have been referred to one child psychiatric outpatient clinic in the Northern Netherlands at any point in their life. Baseline measurement in the clinical cohort took place from September 2004 to December 2005. Data collection for the second wave commenced in September 2006 and will be completed in November 2007. As was expected, non-response in this particular group was larger than it was in the population cohort: 721 of the 1264 children (57.0%) who were eligible to enter the cohort were non-responders. However, there were no significant differences between responders and non-responders in age, sex, level of education of the parents and age of referral to the clinic. Comparisons of teacher reports on mental ill-health and school achievement between responders and non-responders only showed significantly lower mathematics performance in non-responders. The groups did not differ on psychopathology subscales (Table 1) and language performance.

What has been measured?

Table 2 specifies the measures that have been included at the first, second and third waves. Two main principles have been adhered to in the measurement approach. First, it is recognized explicitly in TRAILS that the use of information from multiple sources is important for obtaining a complete picture of behaviour and functioning and reducing mono-informant information bias.[11,12] Adolescents, their parents, teachers and peers all tend to observe partly different aspects of behaviour and functioning that are all likely to be relevant for understanding the presence, severity and determinants of mental health of adolescents. Adolescents' behaviour may vary from one context to another, or from one interaction partner to another, and informants' reports may be affected by their own perspectives.[13] Because there is no gold standard for psychiatric disorders, and reports from different informants tend to correlate only moderately, using information from multiple informants seems the best strategy to chart mental health.[14] Among other things, adherence to this first principle is expressed in the use of child (Youth Self-report; YSR), and parent (Child Behavior Checklist; CBCL) questionnaires on child/adolescent mental health, which are part of the Achenbach System of Empirically Based Assessment (ASEBA),[15,16] and the use of a teacher-report (Teacher Checklist of Psychopathology), which was developed for TRAILS on the basis of the Achenbach Teachers Report Form.[17] It is also expressed in the use of peer nominations to assess adolescents' social status at school.

Secondly, it is acknowledged that for understanding the determinants and development of behaviour and mental health information is needed at different levels, that is, social (e.g. socioeconomic background), psychological (e.g. temperament), and biological (HPA-function, DNA).[18] Adherence to the second principle is demonstrated by the broad range of measures that has been included in the study (Table 2).

The main outcomes in TRAILS include: (1) mental ill-health, including the broadband domains of internalizing and externalizing problems, as well as the specific syndromes such as depression, anxiety, disruptive behaviour problems, attention problems and pervasive developmental problems; (2) social development, including pro- and anti-social behaviour; (3) substance use; (4) adjustment, including well-being and role functioning; and (5) utilization of health and social services. Thus, an important feature of the main outcomes is that they cover maladjustment and mental ill-health as well as adjustment and well-being, in other words, both negative and positive mental health. As has been argued recently by Patel and Goodman in this journal, there lies additional scientific value in studying the promotive factors underlying positive mental health, rather than only studying the causes of mental ill-health.[19]

What has the study found?

Since the data from the baseline measurements have become available about 35 journal articles and book chapters have been published or accepted for publication. Because of the multidisciplinary background of the TRAILS consortium, these papers encompass a broad range of subtopics. The most important findings are briefly discussed here.

There have been a number of psychometrically oriented studies using latent class analyses on several psychopathological outcomes,[20–22] for distinguishing different classes of psychopathological symptoms across several specific types of disorders, such as anxiety and depressive disorder. Such analyses are an important part of psychiatric epidemiology, which in contrast with general epidemiology, deals with changing content of diagnoses and continuing refinement of taxonomic constructs.[23] One important finding from these studies on TRAILS data was that only few adolescents had exclusively DSM-IV anxiety or exclusively DSM-IV depressive symptoms (DSM-IV = Diagnostic and Statistical Manual of mental disorders, 4th edition). Instead, symptoms of DSM-IV anxiety and depressive disorders tended to co-occur, and class distinctions with regard to the

Table 2 What has been measured in the TRAILS study?

Informant/assessment	Characteristics	Tests, variables		
		First wave	Second wave	Third wave
Children/questionnaire				
	Internalizing disorders†	X; Youth Self-Report (YSR), Revised Child Anxiety and Depression Scale (RCADS)	YSR, RCADS	YSR, RCADS
	Externalizing disorders‡	X; Youth Self-Report (YSR), self-reported anti-social behaviour	YSR, self-reported anti-social behaviour	YSR, self-reported anti-social behaviour
	Social problems	X;Youth Self-Report (YSR)	YSR	YSR
	Thought problems	X; Youth Self-Report (YSR)	YSR	YSR
	Attention problems	X; Youth Self-Report (YSR)	YSR	YSR
	Psychotic problems	–	–	CAPE questionnaire
	Somatic health	X	X	X
	Life events	–	X	X
	Self-perception	X; Self-perception Profile for Children (SPF)	–	SPF
	Temperament	X; Early Adolescent Temperament Questionnaire-Revised (EATQ-R)	Behavioural inhibition/ activation	Adolescent Temperament Questionnaire (ATQ), Attentional Control scale
	Personality	–	–	NEO-PI-R (Big Five)
	Parenting	X; EMBU (a Swedish acronym for My Memories of Upbringing)	–	Parent-child relations
	Life style	X; Weekly/daily activities	Weekly/daily activities, health-related behaviour	Weekly/daily activities, health-related behaviour
	Physical development	–	X	X
	Sensitivity to sound/noise	–	–	X
	Physical Well-being	X; e.g. perceived stimulation in home/school environment	X	X
	Social Well-being	X; e.g. received affection from parents/ teacher/peers, perceived status, perceived behavioural confirmation by parents/ teacher/peers	X	–
Children/interview				
	Life-event history calendar	–	–	X
Parents/questionnaire				
	Internalizing disorders†	X; Child Behaviour Checklist (CBCL), History of internalizing behaviour problems in child, Own depression/anxiety problems via Depression Anxiety Stress Scales (DASS)	X; CBCL	X; CBCL

	Externalizing disorders‡	X; Child Behaviour Checklist (CBCL), History of externalizing behaviour problems in child	X; CBCL	X; CBCL
	Social problems	X; Child Behaviour Checklist (CBCL)	X; CBCL	X; CBCL
	Thought problems	X; Child Behaviour Checklist (CBCL)	X; CBCL	X; CBCL
	Attention problems	X; Child Behaviour Checklist (CBCL)	X; CBCL	X; CBCL
	Social behaviour problems	–	X; VISK (Inventory of Social Behaviour in Children)	X; VISK
	Somatic health	X	X	X
	Stressors child over last 2 years	–	X	X
	Medicine use of child	–	X	X
	Health care use	–	X	X
	Developmental history	–	X; Physical maturation	X
	Family Functioning	X; McMaster Family Assessment Device (FAD)	X; FAD	X; FAD
	Temperament	X; Early Adolescent Temperament Questionnaire-Revised (EATQ-R)	–	X; EATQ-R
	Parenting	X; Parental Stress Index (PSI)	–	X; PSI
	Social Skills	X; Social Skills Rating System (SSRS)	X	X
	Own somatic health and health-related behaviour	–	X	X
Parents/interview				
	Family composition	X	–	–
	Developmental history	X; e.g. prenatal problems, chronic conditions in family members, life events, physical development child	–	–
	Physical conditions and accidents	X	–	–
	Use of (mental) health-care	X	X	–
	Family history of psychopathology	X	–	–
	Psychosocial impairments child	X; Columbia Impairment Scale (CIS)	–	–

(continued)

Table 2 Continued

Informant/assessment	Characteristics	Tests, variables First wave	Second wave	Third wave
Teacher/questionnaire				
	Internalizing disorders†	X; Teacher's Checklist of Psychopathology (TCP) = based on the Teacher's Report Form	X; TCP	X; TCP
	Externalizing disorders‡	X; Teacher's Checklist of Psychopathology (TCP) = based on the Teacher's Report Form	X; TCP	X; TCP
	Academic achievement/ performance	X	X	X
	Somatic health	X	X	X
	Contact with others	X; Revised Class Play (RCP)	X; Relational aggression	–
	Behavioural motivation	–	X	X
	Pro-social behaviour	X; Prosocial Behaviour Questionnaire (PBQ)	X; PBQ	X; PBQ
	Character traits	–	X	X
	Social Skills	X; Social Skills Rating System (SSRS)	–	–
Others				
	Intelligence	X; Wechsler Intelligence Scale for Children Revised (WISC-R) subscales vocabulary and	–	–
	Information processing	X; Amsterdam Neuropsychological Tasks (ANT)	–	–
	Baroreflex sensitivity	X; Heartrate measures, blood pressure	–	–
	Cortisol	X	–	–
	Blood, DNA	–	–	X
	Shuttle-run test	–	–	X
	Behaviour experiments	–	–	X
	Peer nominations	X; e.g. Sociometric status, bullying, helping	X	–
	Demographics	X; e.g. Socioeconomic background (education/occupation of father and mother, household income)	–	–

X, measured; – = not measured; †, internalizing disorders encompass withdrawn/depressed behaviour, somatic problems and anxious/depressed behaviour; ‡, externalizing disorders encompass aggressive behaviour and delinquent behaviour.

severity of symptoms fitted the data better than distinctions based on the nature of the symptoms. Similar findings were reported for disruptive behaviours, which according to DSM-IV encompass Attention Deficit/Hyperactivity Disorder (ADHD), Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD). Results of class analyses demonstrated that no class of adolescents could be identified that had symptoms of only one of these DSM-IV types of problem behaviour.

There have been a number of studies assessing (candidate) endophenotypic profiles in the cohort. Endophenotypes are measurable components that are hypothesized to lay on the pathway linking the distal genotype with (psychiatric) disease. Gottesman and Gould describe the rationale behind the concept of endophenotype as providing relatively straightforward and more elementary phenomena as opposed to behavioural phenotypes and therefore require fewer numbers of genes to produce variations in these traits as opposed to behavioural phenotypes or psychiatric diagnoses.[24] These studies include associations of cortisol, as end-product of HPA-axis activity,[25–27] autonomic nervous system functioning,[28] and neuropsychological characteristics[29] with various mental health problems. One important outcome from these studies was that these endophenotypic measures were very weakly associated with psychopathological outcomes in this general population sample. This in strong contrast to the findings reported in much smaller clinical studies.

Other studies assessed associations between temperament and mental health in the cohort.[30–34] Temperament traits accounted for about a third of the relationship of familial loading with mental ill-health in preadolescents (aged 10–11 years), where familial loading refers to the lifetime history of mental health problems reported by the biological parents. However, different temperament traits were related to different specific mental health outcomes and the severity of these outcomes. For instance, the temperament trait of high fear predicted mainly internalizing problems in adolescents, whereas temperament traits of low effortful control and high-intensity pleasure (which expresses adolescents' pleasure derived from novel and intense experiences) more strongly predicted externalizing problems. Moreover, temperament profiles of adolescents appeared to moderate the effect of parenting styles and negative affect on adolescent mental health. Taken together, the findings of these studies demonstrate the central position of adolescent temperament traits in pathways leading from genetic risk, and familial circumstances to mental ill-health.

Finally, a group of studies concerned social relationships in and around the classrooms, expressed for instance in bullying versus victimization of bullying,[35] antisocial vs prosocial behaviour[36] and classroom social status.[37] These studies have demonstrated how important the school social environment is for the development of mental health problems in adolescents, and how important the familial background is for predicting who among the adolescents develops antisocial behaviour (or bullying behaviour) and who becomes the victim of other children's behaviour. For instance, adolescents with a high socioeconomic background measured by parental education, occupation and household income were the least likely to be involved in bullying behaviour, either as being the bullies, the victims or both. But not only *family* socioeconomic background predicted problem behaviour in the sample; *classroom* social position appeared to be related to depression as well. The latter finding is of special interest because it highlights the necessity of measuring the social position of adolescents in their 'own world' in addition to measuring their socioeconomic background defined in terms of conditions in the broader society.

So far, our studies have raised awareness of two principles that seem to be at play, and that will feature in subsequent TRAILS data analyses. The first is that it is necessary to distinguish between factors that determine the severity of mental ill-health in (pre)adolescents on the one hand, and factors that influence the nature or direction of mental health problems (whether internalising or externalising) on the other. To give an example: a temperament characterised by high frustration appeared to act as a general determinant of severity of internalising as well as externalising problems, whereas a temperament characterised by high fear predicted internalising problems, but not externalising and a temperament characterised by low effortful control predicted externalising but not internalising problems.[30,31] The second principle is that the effects of environmental factors such as parenting and stressful life events are moderated by individual characteristics such as gender, temperament and social skills.

What are the main strengths and weaknesses of the study?

TRAILS is a relatively large study in its field, which is a strong point of the study. The sample size provides sufficient power to disentangle covariations between determinants through simultaneous analysis of overlapping, confounding or competing determinants. Another strong point of the study is the combination of a population-based cohort with a clinical cohort. This combination allows for examinations of determinants in the population as well as effects of healthcare and determinants operating within the clinical population, where the burden of mental ill-health is especially high. Thus, the continuity of relationships into the more severe end of psychopathology can be evaluated. Moreover, having access to

population-based data in addition to data from a clinical sample helps to investigate and avoid the effects of what is called Berkson's bias; i.e. bias produced in studies on clinical samples because patients with comorbid pathology are more likely to be referred to mental health services than single disorder patients, and hence are overrepresented in these samples. Another strong point of the study is the breadth of measurement of factors. The study investigates a great number of risk domains (Table 1), uses a multi-informant approach in order to avoid mono-information bias and examines multiple outcomes of mental (ill-)health. A further strong point is that the age range of respondents is quite narrow (between 10 and 12 years at baseline), which allows for inclusion of age appropriate measures of determinants and outcomes and limits problems of inference from results that are related to heterogeneity of findings with age. This is especially relevant for the study of adolescence which is characterised by rapid development.

While the breadth of focus is firstly and foremostly a strong point, it also has a disadvantage. Researchers from various disciplinary backgrounds all want to measure determinants that fit their hypotheses. This limits the possibility somewhat to measure several aspects in depth, without putting too much burden on the study participants. Another weakness of the study is that some important determinants of pathology that operate earlier in the life course, such as prenatal and perinatal complications and early childhood adversity, have been assessed retrospectively. This includes important predictors such as alcohol-use and smoking during pregnancy, and birth weight. Finally, although the sample size is relatively large, it remains too small to study the incidence of disorders with a cumulative incidence in young adulthood of less than 1% such as schizophrenia and autism. Furthermore, it might be that the power will be insufficient to study gene–environment interaction when effects are small.

Can I get hold of the data, where can I find out more?

The TRAILS study is conducted mainly at the Department of Psychiatry, University Medical Center Groningen, The Netherlands, which coordinates the collection, the management and distribution of the data. Contact information can be found at the study website: www.trails.nl. The TRAILS consortium especially welcomes initiatives for cross-validation of findings from epidemiological analyses of similar cohort studies in different countries on the TRAILS database. Further information is available at the study's website or can be requested via e-mail: trails@med.umcg.nl.

Acknowledgements

Participating centers of TRAILS include various Departments of the University of Groningen, the Erasmus Medical Center of Rotterdam, the University of Nijmegen, the Trimbos Institute and the University of Utrecht, The Netherlands. TRAILS is financially supported by grants from The Netherlands Organisation for Health Research and Development (ZonMw 100.001.001), The Netherlands Organization for Scientific Research (GB-MW 940-38-011, GB-MAG 480-01-006; NWO 175.010.2003.005) and the Department of Justice (WODC), and by the participating centres.

References

[1] Murray CJL, Lopez AD. Global mortality, disability, and the contribution of risk factors: Gobal Burden of Disease Study. *Lancet* 1997;**349:**1436–42.

[2] Fergusson DM, Lynskey MT, Horwood LJ. Factors associated with continuity and changes in disruptive behavior patterns between childhood and adolescence. *J Abn Child Psychol* 1996;**24:**533–53.

[3] Newman DL, Moffitt TE, Caspi A, Magdol L, Silva PA, Stanton WR. Psychiatric disorder in a birth cohort of young adults: prevalence, comorbidity, clinical significance, and new case incidence from ages 11 to 21. *J Cons Clin Psychol* 1996;**64:**552–62.

[4] Ferdinand RF, Verhulst FC, Wiznitzer M. Continuity and change of self-reported problem behaviors from adolescence into adulthood. *J Am Acad Child Ad Psychiatry* 1995;**34:**680–90.

[5] Kessler RC, Walters EE, Forthofer MS. The social consequences of psychiatric disorders, III: probability of marital stability. *Am J Psychiatry* 1998;**155:**1092–96.

[6] Kessler RC, Berglund PA, Foster CL, Saunders WB, Stang PE, Walters EE. The social consequences of psychiatric disorders, II: teenage parenthood. *Am J Psychiatry* 1997;**154:**1405–11.

[7] Kessler RC, Foster CL, Saunders WB, Stang PE. The social consequences of psychiatric disorders, I: educational attainment. *Am J Psychiatry* 1995;**152:**1026–32.

[8] Bijl RV, Ravelli A. Current and residual functional disability associated with psychopathology: findings from The Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Psychol Med* 2000;**30:**657–68.

[9] Verhulst FJ, Van der Ende J, Ferdinand RF, Kasius MC. The prevalence of DSM-III-R diagnoses in a national sample of Dutch adolescents. *Arch Gen Psychiatry* 1997;**54:**329–36.

[10] De Winter AF, Oldehinkel AJ, Veenstra R, Brunnekreef A, Verhulst FC, Ormel J. Evaluation of nonresponse bias in mental health determinants and outcomes in a large sample of preadolescents. *Eur J Epidemiol* 2005;**20:**173–81.

[11] Angold A, Costello EJ. The relative diagnostic utility of child and parent reports of oppositional defiant behaviors. *Int J Methods Psychiatr Res* 1996;**6:**253–59.

[12] Sourander A, Helstela L, Helenius H. Parent-adolescent agreement on emotional and behavioral problems. *Soc Psychiatry Psychiatr Epidemiol* 1999;**34:**657–63.

[13] Achenbach TM. Empirically based assessment and taxonomy: applications to clinical research. *Psychol Assessment* 1995;**7:**261–74.

[14] Offord DR, Boyle MH, Racine Y *et al*. Integrating assessment data from multiple informants. *J Acad Child Adolesc Psychiatry* 1996;**35:**1078–85.

[15] Achenbach TM. *Manual for the Youth Self Report and 1991 Profile*. Burlington VT: University of Vermont, Department of Psychiatry, 1991.

[16] Achenbach TM. *Manual for the Child Behavior Checklist/4-18 and 1991 Profile*. Burlington VT: University of Vermont, Department of Psychiatry, 1991.

[17] Achenbach TM. *Manual for the Teachers Report Form and 1991 Profile*. Burlington VT: University of Vermont, Department of Psychiatry, 1991.

[18] Glass TA, McAtee MJ. Behavioral science at the crossroads in public health: extending horizons, envisioning the future. *Soc Sci Med* 2006;**62:**1650–71.

[19] Patel V, Goodman A. Researching protective and promotive factors in mental health. *Int J Epidemiol* 2007;**36:**1242–3.

[20] Sondeijker FEPL, Ferdinand RF, Oldehinkel AJ, Veenstra R, De Winter AF, Verhulst FC. Classes of adolescents with disruptive behaviors in a general population sample. *Soc Psychiatry Psychiat Epidemiol* 2005;**40:**931–38.

[21] Ferdinand RF, Van Lang NDJ, Ormel J, Verhulst FC. No distinctions between different types of anxiety symptoms in pre-adolescents from the general population. *J Anx Dis* 2006;**20:**207–21.

[22] Van Lang NDJ, Ferdinand RF, Ormel J, Verhulst FC. Latent class analysis of anxiety and depressive symptoms of the child behavior checklist and the youth self-report in preadolescents. *Beh Res Therapy* 2006;**44:**849–86.

[23] Burger H, Neeleman J. A glossary on psychiatric epidemiology. *J Epidemiol Community Health* 2007;**61:**185–89.

[24] Gottesman II, Gould TD. The endophenotypic concept in psychiatry: etymology and strategic intentions. *Am J Psychiatry* 2003;**160:**636–45.

[25] Rosmalen JGM, Oldehinkel AJ, Ormel J, De Winter AF, Buitelaar J, Verhulst FC. Salivary cortisol levels in 10–12 year old children; a population-based study of individual differences and potential confounders of the cortisol-psychopathology relationship. *Psychoneuroendocrinol* 2005;**30:**483–95.

[26] Huizink AC, Ferdinand RF, Ormel J, Verhulst FC. Hypothalamic-pituitary-adrenal axis activity and early onset of cannabis use. *Addiction* 2006;**101:**1581–88.

[27] Sondeijker F, Ferdinand RF, Oldehinkel AJ *et al*. Disruptive behaviors and HPA-axis activity in young adolescent boys and girls from the general population. *J Psychiat Res* 2007;**41:**570–78.

[28] Dietrich A, Riese H, Sondeijker FEPL *et al*. Externalizing and internalizing problems in relation to autonomic function: a population-based study in preadolescents. *J Am Acad Child Adolescent Psychiatry* 2007;**46:**378–86.

[29] Brunnekreef JA, de Sonneville LMJ, Althaus M *et al*. Information processing profiles of internalizing and externalizing behavior problems: evidence from a population-based sample of preadolescents. *J Child Psychol Psychiatry* 2007;**48:**185–93.

[30] Oldehinkel AJ, Hartman CA, De Winter AF, Veenstra R, Ormel J. Temperament profiles associated with internalizing and externalizing problems in preadolescence. *Dev Psychopathol* 2004;**16:**421–40.

[31] Ormel J, Oldehinkel AJ, Ferdinand RF *et al*. Internalizing and externalizing problems in adolescence: general and dimension-specific effects of familial loadings and preadolescent temperament traits. *Psychol Med* 2005;**35:** 1825–35.

[32] Oldehinkel AJ, Veenstra R, Ormel J, De Winter AF, Verhulst FC. Temperament, parenting, and depressive symptoms in a population sample of preadolescents. *J Child Psychol Psychiatry* 2006;**47:**684–95.

[33] Veenstra R, Lindenberg S, Oldehinkel AJ, De Winter AF, Ormel J. Temperament, environment, and antisocial behavior in a population sample of preadolescent boys and girls. *Int J Behav Dev* 2006;**30:**422–32.

[34] Oldehinkel AJ, Hartman CA, Ormel J, Ferdinand RF, Verhulst FC. Effortful control as modifier of the association between negative afectivity and psychopathology. *Dev Psychopathol* 2007;**19:**523–39.

[35] Veenstra R, Lindenberg S, Zijlstra BJH, De Winter AF, Verhulst FC, Ormel J. The dyadic nature of bullying and victimization: Testing a dual perspective theory. *Child Dev* 2007;**78:**1843–54.

[36] Veenstra R, Lindenberg S, Oldehinkel AJ, De Winter AF, Verhulst FC, Ormel J. Prosocial and antisocial behavior in preadolescence: teachers and parents' perceptions of the behavior of girls and boys. *Int J Behav Dev* 2008.

[37] Oldehinkel AJ, Rosmalen JGM, Veenstra R, Dijkstra JK, Ormel J. Being admired or being liked: classroom social status and depressive problems in early adolescent girls and boys. *J Abn Child Psychol* 2007;**35:**417–27.